

Appl. No. 10/617,620
Reply to Final Office Action dated October 7, 2005

Docket No. RTN-141PUS

Amendments to the Claims:

This listing of the claims will replace all prior versions, and listings, of the claims in the application:

- 1 1. (Currently Amended) A radiator element comprising:
 - 2 a first pair of notch radiator elements in fin-shaped substrates spaced apart from one another
 - 3 and disposed in a first plane, each of said notch radiator elements having a transition section and
 - 4 a feed surface and being capable of operating over a fractional bandwidth of not less the 3:1;
 - 5 a second pair of notch radiator elements spaced apart from one another and disposed in a
 - 6 second plane which is substantially orthogonal to the first plane in which the first pair of notch
 - 7 radiator elements is disposed, such that the first pair of notch radiator elements are disposed to
 - 8 receive RF signals having a first polarization and the second pair of notch radiator elements are
 - 9 disposed to receive RF signals having a second polarization which is orthogonal to the first
 - 10 polarization, said first and second pairs of notch radiator elements being symmetrically disposed
 - 11 about a centerline defined by an intersection of the first and second planes and each of said notch
 - 12 radiator elements having a feed surface and being capable of operating over a fractional
 - 13 bandwidth of not less the 3:1; and
 - 14 a balanced symmetrical feed including:
 - 15 having a first pair of radio frequency (RF) feed lines, each of the RF feed lines
 - 16 disposed symmetrically about the centerline and each of the RF feed lines disposed
 - 17 adjacent to and electromagnetically coupled to a corresponding one of the feed
 - 18 surfaces the first pair of notch radiator elements; and
 - 19 a second pair of RF feed lines, each of the RF feed lines disposed symmetrically
 - 20 about the centerline and each of the RF feed lines coupled to a feed surface of the second
 - 21 pair of notch radiator elements wherein with the first and second pairs of RF feed lines
 - 22 are coupled to the first and second pairs of notch radiator elements such that the first and
 - 23 second pairs of notch radiator elements are provided having coincident phase centers
 - 24 wherein the pair of radio frequency feed lines forms a signal null point adjacent
 - 25 the transition sections.

Appl. No. 10/617,620
Reply to Final Office Action dated October 7, 2005

Docket No. RTN-141PUS

1 2. (Currently Amended) The radiator element of Claim 41 wherein the balanced symmetrical
2 feed further comprises:

3 a housing having a plurality of four sidewalls with each sidewall having an upper edge
4 surface and a lower edge surface, the housing having a central longitudinal axis which is aligned
5 with the centerline defined by the intersection of the first and second planes forming a cavity;
6 and

7 a raised structure projecting from the upper edge surface of said sidewalls, said raised
8 structure having a substantially pyramidal shape with each of the feed lines in the first and
9 second pairs of feed lines are each disposed on a corresponding one of the four sidewalls
10 and on one of the four sides of the pyramidal-shaped structure wherein each of the feed lines
11 have an end which terminates at a point on the pyramidal-shaped structure which is substantially
12 aligned with the centerline defined by the intersection of the first and second planes and comprise
13 a microstrip transmission line.

1 3. (Currently Amended) The radiator element of Claim 24 wherein:

2 the feed lines are provided as microstrip transmission lines; and

3 each of the notch radiator elements are provided as pair-of-fin-shaped substrates are

4 disposed to form a tapered slot coupled to the pyramidal structure of said balanced symmetrical
5 feed.

1 4. (Original) The radiator element of Claim 1 wherein the balanced symmetrical feed is a raised
2 balanced symmetrical feed.

5. (Cancelled)

1 6. (Currently Amended) The radiator element of Claim 1 wherein the notch radiator elements
2 are each pair of substrates are provided from an electrically conductive material.

1 7. (Currently Amended) The radiator element of Claim 6 wherein the notch radiator elements
2 are each provided from a fin-shaped conductive substrate the pair of substrates comprise copper
3 plated metal.

Appl. No. 10/617,620
Reply to Final Office Action dated October 7, 2005

Docket No. RTN-141PUS

- 1 8. (Currently Amended) The radiator element of Claim 1 wherein the notch radiator elements
2 are each provided from a fin-shaped dielectric substrate having a conductive material disposed
3 thereover the pair of substrates comprise a metalized substrate.
- 1 9. (Currently Amended) The radiator element of Claim 1 wherein each of the substrates has a
2 height of less than approximately $0.25\lambda_L$, where λ_L refers corresponds to the a wavelength of the
3 a low end of a range of operating wavelengths.
10. (Cancelled)
- 1 11. (Cancelled) The radiator element of Claim 1 wherein each of the feed surfaces has a first
2 portion in a first plane and a second portion in a second plane, wherein the first plane forms an
3 angle of from about 90 degrees to about 180 with the second plane.
- 1 12. (Currently Amended) The radiator element of Claim 1 wherein the balanced symmetrical
2 feed further comprises:
3 a cavity having a plurality of sidewall sidewalls, each of the sidewalls having first and
4 second opposing surfaces, a top edge and a bottom edge, said sidewalls arranged to form a cavity
5 having an open end and a top surface disposed adjacent the pair of radio frequency feed lines;
6 and
7 wherein each of the feed lines from the first and second a pair of RF transmission feed
8 lines are, each disposed on one adjacent to an opposing corresponding sidewall surface of said
9 cavity and are having a first feed end electromagnetically coupled to a corresponding one of the
10 notch radiator elements pair of radio frequency feed lines.
- 1 13. (Currently Amended) The radiator element of Claim 12 wherein each of the pair of
2 transmission RF feed lines has first end and a second end with the first end of each of the RF
3 feed lines being coupled to the notch radiator elements further comprise a second feed end; and
4 the radiator element further comprises a balun having a pair plurality of outputs ports, each of the

Appl. No. 10/617,620
Reply to Final Office Action dated October 7, 2005

Docket No. RTN-141PUS

5 output ports coupled to a corresponding one of the second feed-cnds of the pair of RF
6 transmission feed lines.

1 14. (Original) The radiator element of Claim 13 further comprising a pair of amplifiers each
2 coupled between a corresponding one of the balun output ports and the second feed end of one of
3 the pair of transmission RF feed lines.

1 15. (Currently Amended) A wideband antenna comprising:

2 a cavity plate having a first surface and a second opposing surface;
3 a first plurality of fins disposed on the first surface of the cavity plate spaced apart from
4 one another forming a first plurality of tapered slots having a feed surface, said first plurality of
5 fins disposed to receive radio frequency (RF) signals having a first polarization;
6 a second plurality of fins disposed on the first surface of the cavity plate spaced apart
7 from one another forming a second plurality of tapered slots having a feed surface, each of said
8 second plurality of fins disposed to receive RF signals having a second polarization, with the
9 second polarization being substantially orthogonal to the first polarization to a corresponding one
10 of the first plurality of tapered slots and having a feed surface; and
11 a plurality of balanced symmetrical feed circuits disposed on the first surface of said
12 cavity plate, each of said plurality of balanced symmetrical feed circuits having a pair two
13 opposing pairs of radio frequency (RF) feed lines with each RF feed line from the first pair of RF
14 feed lines electromagnetically coupled to the feed surface of a corresponding one of a first pair of
15 fins of the first plurality of fins and each RF feed line from the second pair of RF feed lines
16 coupled to the feed surface of respective one of a first pair of fins of the second plurality of
17 fins on the feed surfaces wherein the feed lines from the balanced symmetrical feed circuits
18 are coupled to the first and second plurality of fins such that the first and second plurality of fins
19 are provided having coincident phase centers.

1 16. (Original) The wideband antenna of Claim 15 wherein the cavity plate further comprises a
2 plurality of apertures; and
3 wherein each of the plurality of balanced symmetrical feed circuits is disposed in a
4 corresponding one of the plurality of apertures.

Appl. No. 10/617,620
Reply to Final Office Action dated October 7, 2005

Docket No. RTN-141PUS

- 1 17. (Original) The wideband antenna of Claim 17 further comprising a connector plate disposed adjacent the second surface of the cavity plate and having a plurality of connections;
- 3 and wherein each of the plurality of balanced symmetrical feed circuits has a plurality of feed connections each coupled to a corresponding one of the plurality of connector plate
- 5 connections.
- 1 18. (Original) The antenna of Claim 15 wherein each of the fins has a height of less than about 2 approximately $0.25\lambda_L$, where λ_L refers to the wavelength of the low end of a range of operating 3 wavelengths.
- 1 19. (Original) The antenna of Claim 15 wherein each of the plurality of balanced symmetrical 2 feed circuits is a raised feed circuit having a shape which conforms to the feed surfaces of a 3 corresponding one of the plurality of fins.
- 1 20. (Original) The antenna of Claim 15 further comprising a plurality of baluns each coupled to 2 a corresponding RF feed line.
- 1 21. (Original) The antenna of Claim 20 further comprising a plurality of RF connectors each 2 coupled to a corresponding one of the plurality of baluns.
22. (Cancelled)
23. (Cancelled)
24. (Cancelled)